



Billing Code 4333–15

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

[FWS–R7–ES–2016–N036; FF07CMM00–FX–FXFR133707REG04]

Marine Mammals; Incidental Take During Specified Activities; Proposed Incidental Harassment Authorization for Northern Sea Otters from the Southcentral Stock in Cook Inlet, Alaska

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of receipt of application and proposed incidental harassment authorization; availability of draft environmental assessment; request for comments.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), in response to a request under the Marine Mammal Protection Act of 1972 (MMPA), as amended, from BlueCrest Alaska Operating LLC (BlueCrest), propose to authorize the incidental taking by harassment of small numbers of northern sea otters from the Southcentral stock in Cook Inlet, Alaska, from date of issuance – October 31, 2016. BlueCrest has requested this authorization for their planned oil and gas exploration activities. We anticipate no take by injury or death and include none in this

proposed authorization, which would be for take by harassment only.

DATES: We will consider comments we receive on or before [**INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**].

ADDRESSES:

Document availability: The incidental harassment authorization request, associated draft environmental assessment, and supporting documentation, such as Literature Cited, are available for viewing at <http://www.fws.gov/alaska/fisheries/mmm/iha.htm>.

Comments submission: You may submit comments on the proposed incidental harassment authorization and associated draft environmental assessment by one of the following methods:

- *U.S. mail or hand-delivery:* Public Comments Processing, Attn: Kimberly Klein, U.S. Fish and Wildlife Service, MS 341, 1011 East Tudor Road, Anchorage, AK 99503;
- *Fax:* 907-786-3816, attention to Kimberly Klein; or
- Email comments to: FW7_AK_Marine_Mammals@fws.gov.

Please indicate to which document, the proposed incidental harassment authorization, or the draft environmental assessment, your comments apply. We will post all hardcopy comments on <http://www.fws.gov/alaska/fisheries/mmm/iha.htm>.

FOR FURTHER INFORMATION CONTACT: To request copies of the application, the list of references used in the notice, and other supporting materials, contact Kimberly Klein, by mail

at Marine Mammals Management, U.S. Fish and Wildlife Service, MS 341, 1011 East Tudor Road, Anchorage, AK 99503; by email at kimberly_klein@fws.gov; or by telephone at 1–800–362–5148.

SUPPLEMENTARY INFORMATION: In response to a request under section 101(a)(5)(D) of the Marine Mammal Protection Act of 1972 (MMPA), as amended, from BlueCrest, we propose to authorize the incidental taking by harassment of small numbers of northern sea otters from the Southcentral stock in Cook Inlet, Alaska, from date of issuance – October 31, 2016. BlueCrest has requested this authorization for their planned oil and gas exploration activities. We anticipate no take by injury or death and include none in this proposed authorization, which would be for take by harassment only.

Executive Summary

Why We Need to Publish an Incidental Harassment Authorization

In November 2015, the Service was petitioned by BlueCrest to provide authorization for the incidental take by harassment of northern sea otters (*Enhydra lutris kenyoni*) under the MMPA. This proposed authorization is an official document that announces and explains the Service's draft determination to issue an authorization and our plans to address any potential impacts of BlueCrest's plans to conduct an oil and gas production drilling program in lower Cook Inlet on State of Alaska Oil and Gas Lease 384403 under the program name of Cosmopolitan State during the open water season of 2016. The proposed authorization discusses the incidental

taking by harassment of small numbers of northern sea otters from the Southcentral stock in Cook Inlet, Alaska, from date of issuance – October 31, 2016.

The Effect of this Authorization

The MMPA allows, upon request, the incidental take of small numbers of marine mammals as part of a specified activity within a specified geographic region. In this case, the activity is related to oil and gas development. As part of this authorization, the Service may authorize incidental take to BlueCrest if we find that the taking would:

- Be of small numbers;
- Have no more than a “negligible impact” on northern sea otters; and
- Not have an “unmitigable adverse impact” on the availability of the species or stock for “subsistence” uses.

The Service may stipulate the permissible methods of taking and require mitigation, monitoring, and reporting of such takings, which are meant to reduce or minimize negative impacts to the northern sea otters.

Request for Public Comments

We intend that any final action resulting from this proposal will be as accurate and as effective as possible. Therefore, we request comments or suggestions on this proposed authorization. We particularly seek comments concerning:

- (1) Will the proposed authorization including the proposed activities have a negligible impact on the Southcentral stock of the northern sea otter?;
- (2) Will the proposed authorization ensure that an unmitigable adverse impact on the availability of northern sea otters for subsistence taking does not occur?; and,
- (3) Are there any additional provisions we may wish to consider to ensure the conservation of the Southcentral stock of the northern sea otter?

You may submit your comments and materials concerning this proposed authorization by one of the methods listed in the **ADDRESSES** section. We will not consider comments sent by email or fax, or to an address not listed in the **ADDRESSES** section.

If you submit a comment via FW7_AK_Marine_Mammals@fws.gov, your entire comment—including any personal identifying information—may be available to the public. If you submit a hardcopy comment that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy comments on <http://www.fws.gov/alaska/fisheries/mmm/iha.htm>.

Background

Section 101(a)(5)(D) of the MMPA, as amended (16 U.S.C. 1371 (a)(5)(D)), authorizes the Secretary of the Interior to allow, upon request of a citizen, for periods of not more than 1 year and subject to such conditions as the Secretary may specify, the incidental but not intentional taking by harassment of small numbers of marine mammals of a species or population stock, by such citizens, while engaging in that activity within that region if the Secretary finds that such harassment during each period concerned:

- (1) Will have a negligible impact on such species or stock, and
- (2) Will not have an unmitigable adverse impact on the availability of such species or stock for taking for subsistence.

As part of the authorization process, we prescribe permissible methods of taking, and other means of effecting the least practicable impact on the species or stock and its habitat, and requirements pertaining to the monitoring and reporting of such takings.

The term “take,” as defined by the MMPA, means to harass, hunt, capture, or kill, or to attempt to harass, hunt, capture, or kill any marine mammal. Harassment, as defined by the MMPA, means “any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (the MMPA calls this Level A harassment), or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (the MMPA calls this Level B harassment).”

The terms “small numbers,” “negligible impact,” and “unmitigable adverse impact” are defined in 50 CFR 18.27, the Service’s regulations governing take of small numbers of marine mammals incidental to specified activities. “Small numbers” is defined as “a portion of a marine mammal species or stock whose taking would have a negligible impact on that species or stock.”

However, we do not rely on that definition here, as it conflates the terms “small numbers” and “negligible impact,” which we recognize as two separate and distinct requirements. Instead, in our small numbers determination, we evaluate whether the number of marine mammals likely to be taken is small relative to the size of the overall population. “Negligible impact” is defined as “an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.” “Unmitigable adverse impact” is defined as “an impact resulting from the specified activity (1) that is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by (i) causing the marine mammals to abandon or avoid hunting areas, (ii) directly displacing subsistence users, or (iii) placing physical barriers between the marine mammals and the subsistence hunters; and (2) that cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.”

Section 101(a)(5)(D) of the MMPA establishes an expedited process by which citizens of the United States can apply for an authorization to incidentally take small numbers of marine mammals where the take will be limited to harassment. Section 101(a)(5)(D)(iii) establishes a 45-day time limit for Service review of an application, followed by a 30-day public notice and comment period on any proposed authorizations for the incidental harassment of marine

mammals. Within 45 days of the close of the comment period, we must either issue or deny issuance of the authorization. We refer to these authorizations as IHAs.

The Service has issued IHAs for sea otters in the past, including the following:

Northern sea otters: IHAs incidental to airport construction on Akun Island and hovercraft operation between Akun Island and Akutan, Alaska (August 27, 2008 (73 FR 50634); June 8, 2010 (75 FR 32497); and April 1, 2011 (76 FR 18232)); and an IHA to cover the incidental take of northern sea otters due to previous oil and gas exploration activities in Cook Inlet, Alaska (August 29, 2014 (79 FR 51584)). None of these IHAs remain in effect.

Southern sea otters (*E.L. nereis*): IHAs incidental to construction activities associated with a tidal wetlands restoration project on the Elkhorn Slough National Estuarine Research Reserve in Monterey County, California (July 20, 2010 (75 FR 42121)), and incidental to the replacement of pier piles and the potable water line at U.S. Coast Guard Station Monterey in Monterey County, California (September 30, 2014 (79 FR 58796)).

Summary of Request

On November 12, 2015, the Service received a request from BlueCrest for the nonlethal taking, by harassment, of northern sea otters (hereafter “otters”) from the Southcentral stock incidental to plans to conduct an oil and gas production drilling program in lower Cook Inlet on State of Alaska Oil and Gas Lease 384403 under the program name of Cosmopolitan State. The program includes drilling up to three wells with the total operation time of about 135 days. The exact

timing of the project will be dependent upon rig availability, but will occur in the summer operating season between April 15 and October 31, 2016.

In 2013, BlueCrest conducted exploratory oil and gas drilling at a well site in the lower Cook Inlet. Beginning in spring 2016, BlueCrest proposes to drill two more wells to tap these identified gas layers for production and a third well to collect geological information. The proposed BlueCrest drilling operations could harass local sea otters via its impulsive acoustics from the periods of conductor pipe driving (CPD) and vertical seismic profiling (VSP) activities. Harassment is a form of take as defined under the MMPA.

BlueCrest is requesting incidental take authorization for Level B noise harassment (noise exceeding 160 decibels (dB, all dB levels given herein are re: 1 μ Pa RMS) associated with the oil and gas drilling activities. Actual Level B “takes” will depend upon the number of sea otters occurring within the 160 dB zone of influence (ZOI) at the time of seismic activity. BlueCrest does not believe any Level A injury “takes” (noise exceeding 190 dB) are expected with proposed mitigation measures in place.

A complete copy of BlueCrest’s request and supporting documents may be obtained as specified above in **ADDRESSES**.

Prior to issuing an IHA in response to this request, the Service must evaluate the level of industrial activities described in the application, their associated potential impacts to sea otters, and their potential effects on the availability of this species for subsistence use. The information

provided by the applicant indicates that oil and gas activities projected over the next year will encompass offshore exploration activities. The Service is tasked with analyzing the impact that lawful industrial activities will have on sea otters during normal operating procedures.

Description of the Specified Activities

In 2013, BlueCrest, then in partnership with Buccaneer Energy, conducted exploratory oil and gas drilling at the Cosmopolitan State #A-1 well site (then called Cosmopolitan State #1). The well encountered multiple oil and gas zones, including gas zones capable of production in paying quantities. Beginning in spring 2016, BlueCrest proposes to drill two more wells (Cosmopolitan State #A-2 and #A-3) to tap these identified gas layers for production. These directionally drilled wells have top holes located a few meters from the original Cosmopolitan State #A-1, and together could feed to a future single offshore platform. Both #A-2 and #A-3 may involve test drilling into oil layers. A third well, #B-1, will be located approximately 1.7 kilometer (km) (1 mile (mi)) southeast of the other three wells. This well will be drilled into oil formations to collect geological information. After testing, the oil horizons will be plugged and abandoned, while the gas zones will be suspended pending platform construction. Refer to Table 1 and Figure 1 for further location details.

Table 1. Locations of Proposed Cosmopolitan State Well Sites

| Well Name | Latitude | Longitude | Water Depth |
|-------------------------|-----------------|------------------|--------------------|
| Cosmopolitan State #A-1 | N 59°53'13.0" | W 151°52'58.0" | 23.8 m |
| Cosmopolitan State #A-2 | N 59°53'13.1" | W 151°52'58.1" | 23.8 m |
| Cosmopolitan State #A-3 | N 59°53'13.2" | W 151°52'58.2" | 23.8 m |

| | | | |
|-------------------------|-------------|--------------|--------|
| Cosmopolitan State #B-1 | N 59°52'12" | W 151°52'17" | 20.7 m |
|-------------------------|-------------|--------------|--------|

Whenever practicable, BlueCrest will use existing infrastructure and resources found on the Kenai Peninsula and south-central Alaska. These resources include barge landings, private staging areas, airstrips, landfills, water supplies, heavy equipment, and personnel. Most on-shore activity will base from either Kenai or Homer.

BlueCrest proposes to conduct its production and exploratory drilling using the *Spartan 151* drill rig or similar rig (e.g., the Endeavour). The *Spartan 151* is a 150 H class independent leg, cantilevered jack-up drill rig with a drilling depth capability of 7,620 meters (m) (25,000 feet (ft)), that can operate in maximum water depths up to 46 m (150 ft). To maintain safety and work efficiency, the exploratory drill rigs will be equipped with the following:

- A 5,000-, 10,000-, or 15,000-pounds per square inch (psi) blowout preventer (BOP) stack—for drilling in higher pressure formations found at greater depths in Cook Inlet;
- Sufficient variable deck load to accommodate the increased drilling loads and tubular for deeper drilling;
- Reduced draft characteristics to enable the rig to easily access shallow water locations;
- Riser tensioning system to adequately deal with the extreme tides/currents in up to 91-m (300-ft) water depth;
- Steel hull designed to withstand -10 degrees Celsius to eliminate the risk of steel failure during operations in Cook Inlet (i.e., built for North Sea arctic conditions); and

- Ability to cantilever over existing platforms for working on development wells or during plug and abandonment.



The *Spartan 151* is likely to be moored at Port Graham over the winter of 2015–2016 where it will undergo maintenance and winterization. BlueCrest proposes to move the drill rig to the Cosmopolitan State #B–1 well site at some point after April 15, 2016. The tow would likely be

accomplished within a 48-hour (hr) period. Any subsequent move will be controlled by the owner of the drilling rig. The rig will be towed between locations by ocean-going tugs that are licensed to operate in Cook Inlet and will be conducted in accordance with State and Federal regulations. Rig moves will be conducted in a manner to minimize any potential risk regarding safety as well as cultural or environmental impact.

While under tow to the Cosmopolitan well sites, rig operations will be monitored by BlueCrest and the drilling contractor management. Very high frequency radio, satellite, and cellular phone communication systems will be used while the rig is under tow. Helicopter transport will also be available. A certified marine surveyor will be monitoring during rig moves.

The rig will be stocked with most of the drilling supplies required to complete a full summer program. Deliveries of remaining items, including crew transfers, will be performed by support vessels and helicopters.

BlueCrest proposes to use helicopters for project operations. This may include transportation for personnel, groceries, and supplies. Helicopter support will consist of a twin-turbine Bell 212 (or equivalent) helicopter certified for instrument flight rules for land and over-water operations. Helicopter crews and support personnel will be housed in existing Kenai area facilities. The helicopter will be based at the Kenai Airport and/or Homer Airport to support rig crew changes and cargo handling. No helicopter refueling will take place on the rig.

Helicopter flights to and from the rig are expected to average two per day. Flight routes will follow a direct route to and from the rig location, and flight heights will be maintained 300 to 450 m (1,000 to 1,500 ft) above ground level to avoid acoustical harassment of marine mammals (Richardson *et al.* 1995). The aircraft will be dedicated to the drilling operation and will be available for service 24 hr/day. A replacement aircraft will be available when major maintenance items are scheduled.

Major supplies will be staged on-shore at Kenai. Required supplies and equipment will be moved from the staging area by contracted supply vessels and loaded aboard the rig when the rig is established on a drilling location and will include fuel, drilling water, mud materials, cement, casing, and well service equipment. Supply vessels will be outfitted with fire-fighting systems as part of fire prevention and control as required by Cook Inlet Spill Prevention and Response, Inc. (CISPRI).

Rig equipment will use diesel fuel or electricity from generators. Personnel associated with fuel delivery, transfer, and handling will be knowledgeable of Best Management Practices (BMP) of Industry (Collectively, the entities, personnel, and companies involved in the following activities: oil and gas exploration, development, and production; oil and gas support services; and associated activities such as research). BMPs are related to fuel transfer and handling, drum labeling, secondary containment guidelines, and the use of liners/drip trays.

When planned and permitted operations are completed, the well will be suspended according to Alaska Oil and Gas Conservation Commission regulations. Drilling wastes include drilling

fluids, known as mud, rock cuttings, and formation waters and will be discharged to the Cook Inlet under an approved Alaska Pollution Discharge Elimination System (APDES) general permit or sent to an approved waste disposal facility. Drilling wastes (hydrocarbon) will be delivered to an onshore permitted location for disposal. BlueCrest will follow BMPs and all stipulations of the applicable permits for this activity. Fluids and cutting management does not produce any noise signature to the marine environment that is not already included in other activities provided herein.

The project components with a potential for harassment of marine mammals include:

1. Towing of the jack-up drill rig to and between the Cosmopolitan well sites;
2. Impact hammering of the drive pipe at the well prior to drilling; and
3. The VSP operations that may occur at the completion of drilling.

For these activities the primary impact of concern is the effect the noise generated by these operations could have on local marine mammals. Underwater noise associated with drilling and rig operation has already been determined by the National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration (NOAA) and the Service in prior consultations to have little effect on marine mammals (based on Marine Acoustics, Inc.'s (2011) acoustical testing of the *Spartan 151* while drilling), thus is not addressed further in this petition. Helicopters will be used to transport personnel on and off the drill rig, but any noise-related impacts to sea otters will be avoided by maintaining 300- to 450-m (1,000- to 1,500-ft) flight altitudes. The Service has determined that Level B disturbance harassment of sea otters can

occur when the animals are exposed to underwater noise exceeding 160 dB, regardless of whether the noise is continuous or impulsive. Towing, CPD, and VSP are the only planned operations expected to produce underwater noise exceeding 160 dB, and are the subjects of this petition.

Rig Tow – The jack-up rig would be towed to the first well site (#B-1) during early spring or summer 2016. It is estimated that the tow will take about 48 hours to complete. Tows lasting less than a day will also occur between well sites. Tugs generate their loudest sounds while towing due to the propeller cavitations. These continuous sounds have been measured at up to 171 dB at 1-m source (Richardson *et al.* 1995), and they are generally emitted at dominant frequencies of well less than 5 kilohertz (kHz) (Miles *et al.* 1987, Richardson *et al.* 1995, Simmonds *et al.* 2004). Since it is currently unknown which tugs will be used to tow the rig on each tow (to and from the well site), and there are few sound signatures for tugs in general, it is assumed that noise exceeding 160 dB extends 253 m (830 ft) from the operating tugs (based on a 171 dB source). The tug's cavitating propellers do not exceed 190 dB at 1-m source, thus they do not represent a Level A injury take concern.

Drive Pipe Placement – A drive pipe is a relatively short, large-diameter pipe driven into the sediment prior to the drilling of oil wells. Drive pipes are usually installed using pile-driving techniques. BlueCrest proposes to drive approximately 60 m (200 ft below mudline) of 76.2-cm (30-in) pipe at each well site prior to drilling using a Delmar D62–22 impact hammer. This hammer has impact weight of 6,200 kilograms (kg) (13,640 pounds (lb)) and reaches a maximum impact energy of 224 kilonewton-m (165,215 ft-lb) at a drop height of 3.6 m (12 ft). Illingworth

& Rodkin (2014) measured the noise from a hammer operating from the *Endeavour* in 2013 and found noise levels exceeding 160 dB out to 1.63 km (1 mi; disturbance zone), 180 dB to 170 m (560 ft; cetacean injury zone), and 190 dB to 55 m (180 ft; pinniped injury zone). The drive pipe driving event is expected to last 1 to 3 days at each well site (12 days maximum), although actual noise generation (pounding) would occur only intermittently during this period.

Vertical Seismic Profiling – Data on geological strata depth collected during initial seismic surveys at the surface can only be inferred. However, once a well is drilled, accurate followup seismic data can be collected by placing a receiver at known depths in the borehole and shooting a seismic airgun at the surface near the borehole. This data provides not only high-resolution images of the geological layers penetrated by the borehole, but can be used to accurately correlate (or correct) these original surface seismic data. The procedure is known as VSP. BlueCrest proposes to conduct VSP operations at the end of drilling each well using an array of airguns with total volumes of between 600 and 880 cubic inches (in³). The actual size of the airgun array will not be determined until the final well depth is known. The VSP operation is expected to last less than 2 days at each well site. Illingworth & Rodkin (2014) measured noise levels associated with VSP (using a 750 in³ airgun array) conducted at Cosmopolitan State #A-1 in 2013. The results indicated that the 190 dB radius (Level A take threshold for pinnipeds) from source was 120 m (394 ft), and the 160 dB radius (Level B disturbance take threshold) was 2.47 km (1.54 mi).

Dates and Duration of Proposed Activity and Specific Geographical Region

The request for incidental harassment authorization is for the 2016 drilling season at BlueCrest's Cosmopolitan State unit in lower Cook Inlet. Exploratory drilling will be conducted within a 165-day operating timeframe and completed by October 31, 2016. It is expected that the program will take 135 days to complete.

Distribution, Abundance, and Use of Sea Otters in the Area of Specified Activity

Based on the proposed activity area, this IHA addresses potential impacts of BlueCrest's exploration activities on the portion of the Southcentral Alaska stock of the northern sea otter that inhabits the eastern shoreline of lower Cook Inlet. The Southcentral stock is classified as "non-strategic" because the level of direct human-caused mortality does not exceed the Potential Biological Removal (PBR), and it is neither listed as "depleted" under MMPA, nor as "threatened" or "endangered" under the Endangered Species Act of 1973, as amended (ESA).

Sea otter populations found along the western shoreline of lower Cook Inlet, including Kamishak Bay, are part of the Southwest Alaska stock, which is listed as threatened under the ESA, but it is assumed that no Southwest Alaska stock sea otters will be impacted by the proposed project and are thus not analyzed as part of this IHA.

Based on the Service's 2014 Stock Assessment Report, the estimated abundance of the Southcentral sea otter stock (stock being analyzed as part of this IHA) is approximately 18,000

sea otters (USFWS 2014a). Aerial surveys in Kachemak Bay in 2002, 2007, and 2008, indicated that the sea otter population is increasing. The rate of increase for the Cook Inlet portion of the population is unknown because surveys have not been repeated; however, it is assumed to be similar to that in Kachemak Bay between 2002 and 2014. The 2002 estimate of sea otter population size for Cook Inlet was, therefore, adjusted to allow for population growth at the same rate as Kachemak Bay, which predicted an annual population growth of 495 animals and an estimated population size of 6,904 animals for Cook Inlet (USFWS 2014b). The relative abundance of otters in Cook Inlet is highest in the southern end of lower Cook Inlet in Kachemak and Kamishak bays. Upper Cook Inlet does not offer suitable habitat and is virtually devoid of sea otters. The northern portion of lower Cook Inlet, including the project area, is likely to have lower density of sea otters than Kachemak and Kamishak bays, but may have periods of high seasonal use.

There are no published sea otter estimates for the specified project area. Surveys suggest for most of the year, few sea otters inhabit waters north of Anchor Point (Rugh et al. 2005; Larned 2006; Gill et al. 2009; Doroff and Badajos 2010). Gill et al. (2009) did not survey north of Anchor Point, but did find rafts of dozens of sea otters along their transect line closest to Anchor Point during August, but not during May or February. Doroff and Badajos (2010) tracked 44 radio-tagged sea otters for 3 years, and did not locate any sea otters outside of Kachemak Bay other than a male that was subsistence harvested by a Ninilchik villager (although the exact location of harvest is unknown). During June surveys for beluga whales conducted between 1993 and 2004, Rugh et al. (2005) recorded 2,111 sea otters in lower Cook Inlet, but virtually

none north of Anchor Point (even though the length of the Kenai Peninsula was surveyed each year).

Recent (2013) marine mammal monitoring (for the Cosmopolitan State exploratory drilling program) conducted 5 km (3 mi) offshore of Cape Starichkof revealed that during August, up to 481 sea otters (median of 72 sea otters) were found riding the tides between Anchor Point and some point well north of Cape Starichkof (Owl Ridge 2014). It is likely that this late summer phenomenon is a result of seasonal weather conditions that allow sea otters to safely ride the daily tides to foraging grounds outside Kachemak Bay. Since none of the previous surveys were conducted during the fall, it is unknown how late into fall large numbers of sea otters are found north of Anchor Point. Doroff and Badajos (2010) could not locate 10 of the radio-tagged sea otters in August 2009 but these were subsequently found in September 2009. It is possible that these sea otters had moved north of Anchor Point (outside the study area) during August, only to return to Kachemak Bay in September.

Thus, the primary concern with sea otters is where planned exploration activities and support activities might overlap with seasonal sea otter use north of Anchor Point in August. Sea otter use past October 31 is not relevant to this IHA as the activities will not be taking place.

Survey activities will be conducted in the intertidal areas when those areas contain residual water (i.e., slack tide), and thus the Service has determined that the onshore and intertidal portions of BlueCrest's proposed activities will not likely interact with, or impact, northern sea otters. Therefore, those seismic activities and related operations are not addressed in this IHA. Sea otters may be found within all water depths and distances from shore in the proposed project areas. During Kenai Peninsula and Lower Cook Inlet sea otter aerial surveys, Bodkin et al. (2003) found that sea otters predominantly use the nearshore areas (≥ 40 m; 131.2 ft) due to increased foraging opportunities (Riedman and Estes 1990; Schneider 1976).

Biological information for the Southcentral stock of northern sea otters can be found in the Service's Stock Assessment Report for the Southcentral Stock of Northern Sea Otters (Service 2014) (<http://www.fws.gov/alaska/fisheries/mmm/seaotters/reports.htm>).

Potential Impacts of the Activities on Sea Otters

Understanding the effects of sound from oil and gas exploration on sea otters is important for the health of sea otters and the development of parameters by which sea otter takes can be established and monitored. The proposed actions from BlueCrest have the potential to disturb sea otters, particularly in protected waters in nearshore habitats, which are used for resting, pup rearing, and foraging.

The proposed BlueCrest drilling operations that could impact local sea otters are impulsive acoustical harassment from the brief periods of CPD and VSP activities. Disruptions are not

likely to be significant enough to rise to the level of a take unless the sound source displaces a sea otter from an important feeding or breeding area for a prolonged period, and this project is unlikely to do so. The continuous underwater noise generated by BlueCrest's proposed drilling operations would expose diving sea otters for only a couple of minutes at most.

The airborne sound sources include rig towing, noise generated from routine rig activities, and periodic air traffic. Routine boat traffic noise produced by all operators will also generate airborne sound. The Service believes that airborne sound sources will not exceed 160 dB (Level B harassment) and will not affect sea otters (Richardson 1995). Adherence to specified operating conditions for vessels and aircraft will ensure that these airborne sound sources do not take sea otters.

When disturbed by noise, sea otters may respond behaviorally (e.g., escape response) or physiologically (e.g., increased heart rate, hormonal response) (Harms et al. 1997; Tempel and Gutierrez 2003). Either response results in a diversion from one biological activity to another. That diversion may cause stress (Goudie and Jones 2004), and it redirects energy away from fitness-enhancing activities such as feeding and mating (Frid and Dill 2002). Other changes in activities as a result of anthropogenic noise can include increased alertness, vigilance, agonistic behavior, escape behavior, temporary or permanent abandonment of an area, weakened reflexes, and lowered learning responses (van Polanen Petel et al. 2006). Chronic stress can lead to loss of immune function, decreased body weight, impaired reproductive function, and abnormal thyroid function.

Despite the importance of understanding the effects of sound on sea otters, very few controlled experiments or field observations have been conducted to address this topic. Those studies that have been conducted conclude that sea otters are generally quite resistant to the effects of sound, and that change to presence, distribution, or behavior resulting from acoustic stimuli is rare (Ghoul et al. 2012a and b; Reichmuth and Ghoul 2012; Riedman 1984). Additionally, when sea otters have displayed behavioral disturbance to acoustic stimuli, they quickly become habituated and resume normal activity (Ghoul et al. 2012b).

The primary potential impact of the proposed BlueCrest drilling operations to local sea otters is from rig towing, noise generated from routine rig activities, periodic air traffic, and impulsive acoustical harassment from the brief periods of conductor pipe driving and VSP activities.

Although the number of individual sea otters that might be exposed to harassment level noise represents a small portion of the total estimated stock population, what is known about the sea otter's behavioral responses to noise stimuli is addressed below. Disruptions are not likely to be significant enough to rise to the level of a take unless the sound source displaces a marine mammal from an important feeding or breeding area for a prolonged period, and this project is unlikely to do so.

Disturbance from Vessel Traffic and General Operations

Sea otters generally show a high degree of tolerance and habituation to shoreline activities and vessel traffic, but disturbance may cause animals to disperse from the local area. Populations of sea otters in Alaska have been known to avoid areas with heavy boat traffic but return to those

same areas during seasons with less traffic (Garshelis and Garshelis 1984). Sea otters in Alaska have shown signs of disturbance (escape behaviors) in response to the presence and approach of survey vessels, including: diving and/or actively swimming away from a boat; hauled-out sea otters entering the water; and groups of sea otters disbanding and swimming in multiple different directions (Udevitz et al. 1995). However, sea otters off the California coast showed only mild interest in boats passing within hundreds of meters, and sea otters in California appear to have habituated to boat traffic (Riedman 1983; Curland 1997). Their behavior is suggestive of a dynamic response to disturbance, abandoning areas when disturbed persistently and returning when the disturbance ceased. From the above research it is likely that some degree of disturbance from vessel traffic associated with the proposed actions will occur. Sea otters reacting to vessels they encounter may consume energy and divert time and attention from biologically important behaviors, such as feeding. However, these disturbances are expected to be short term in duration, and this potential short-term displacement is not anticipated to affect the overall fitness of any individual animal. We also anticipate that individual sea otters will habituate to the presence of project vessels and associated noise. Boat traffic, commercial and recreational, is constant in Cook Inlet. Some sea otters in the area of activity are likely to become habituated to vessel traffic and noise caused by vessels due to the existing continual traffic in the area. The additional vessel activity that will occur related to these three projects is not expected to substantially increase vessel noise or activity in the action area above that which is already occurring.

Sea otter collisions with vessels associated with the proposed project are unlikely. Tugs and barges are slow moving and pose little risk of colliding with sea otters. No fast boat use is

proposed, and it is unlikely that housing and crew transfer vessels will impact sea otters. Vessels proposed for use to transfer housing and crew can produce noises exceeding 190 dB when traveling at higher speeds. However, the influence of this sound is limited to a distance of 2 to 4 m (6.6 to 13.1 ft) from the vessel. Adherence to operating conditions will ensure that these vessels do not take sea otters.

Disturbance from Noise

Effects of noise on marine mammals are highly variable and can be categorized as: tolerance; masking of natural sounds; behavioral disturbance; temporary or permanent hearing impairment; and non-auditory effects, such as female-pup separations (Richardson et al. 1995). Whether a specific noise source will cause harm and/or disturbance to a sea otter depends on several factors, including the distance between the animal and the sound source, the sound intensity, background noise levels, the noise frequency (cycles per second; hertz (Hz) or kHz), noise duration, whether the noise is pulsed or continuous, and whether the noise source originates in the aquatic or terrestrial environment. For sea otters, behavioral reactions may be shown, such as changing durations of surfacing and dives; changing direction and/or speed; reduced/increased vocal activities; changing/cessation of socializing or feeding; visible startle response; avoidance of areas where noise sources are located; and/or flight response (e.g., sea otters flushing into water from haul-outs). The consequences of behavioral modification have the potential to be biologically significant if the change affects growth, survival, and reproduction.

Information regarding the northern sea otter's hearing abilities is limited; however, the closely related southern sea otter has some information showing this subspecies' range of hearing. Reichmuth and Ghoul (2012) tested the aerial (from airborne sound sources) hearing capabilities of one male southern sea otter believed to have typical hearing. The study revealed an upper frequency hearing limit extending to at least 32 kHz and a low-frequency limit below 0.125 kHz. These results are generally consistent with comparable data for other carnivores, including terrestrial mustelids. This range is also similar to that of harbor seals (*Phoca vitulina*; Pinnipedia) (0.075 to 30 kHz) (Kastak and Schusterman 1998; Hemilä et al. 2006; Southall et al. 2007), which suggests pinnipeds may be a good proxy for sea otters.

Additionally, sea otters and harbor seals both exhibit amphibious hearing and spend a considerable amount of time above water, where they are not disturbed by airborne sound sources; southern sea otters spend about 80 percent of their time at the sea surface, whereas harbor seals may spend up to 60 percent of their time hauled out of the water (Frost *et al.* 2001).

Riedman (1983) examined changes in the behavior, density, and distribution of southern sea otters at Soberanes Point, California, that were exposed to recorded noises associated with oil and gas activity. The underwater sound sources were played at a level of 110 dB and a frequency range of 50–20,000 Hz and included production platform activity, drillship, helicopter, and semi-submersible sounds. Riedman (1983) also observed the sea otters during seismic airgun shots fired at decreasing distances from the nearshore environment (50, 20, 8, 3.8, 3, 1, and 0.5 nautical miles) at a firing rate of 4 shots per minute and a maximum air volume of 4,070 cubic inches. Riedman (1983) observed no changes in the presence, density, or behavior of sea

otters as a result of underwater sounds from recordings or airguns, even at the closest distance of 0.5 nautical miles (<1 km). Sea otters did, however, display slight reactions to airborne engine noise. Riedman (1983) concluded that seismic activities had no measurable effect on sea otter behavior. The experiment was repeated the following year (Riedman 1984) with the same results.

In another controlled study using prerecorded sounds, Davis et al. (1988) exposed both northern sea otters in Simpson Bay, Alaska, and southern sea otters in Morro Bay, California, to a variety of aerial (airborne) and underwater sounds, including a warble tone, sea otter pup calls, killer whale calls, airhorns, and an underwater acoustic harassment system designed to drive marine mammals away from crude oil spills. The sounds were projected at a variety of frequencies, decibel levels, and intervals. The authors noted that certain acoustic stimuli could cause a startle response and result in dispersal. However, the disturbance effects were limited in range (no responses were observed for sea otters approximately 100–200 m (328–656 ft) from the source of the stimuli), and habituation to the stimuli was generally very quick (within hours or, at most, 3–4 days).

Previous work suggests that sea otters may be less responsive to marine seismic pulses than some other marine mammals. Riedman (1983, 1984) monitored the behavior of sea otters along the California coast while they were exposed to a single 100-in³ airgun and a 4,089-in³ airgun array. No disturbance reactions were evident when the airgun array was as close as 0.9 km. Sea otters also did not respond noticeably to the single airgun. Sea otters spend a great deal of time at the surface feeding and grooming (Riedman 1983, 1984; Wolt et al. 2012). While at the

surface, the potential noise exposure of sea otters would be much reduced by pressure-release and interference (Lloyd's mirror) effects at the surface (Greene and Richardson 1988; Richardson et al. 1995). Finally, the average dive time of a northern sea otter has been measured at only 85 sec (Bodkin et al. 2004) to 149 sec (Wolt et al. 2007), thereby limiting exposure during active seismic operations. It remains unclear whether seismic generated sound levels even rise to the level of take at distances beyond 0.9 km, given the animal's poor underwater hearing ability and surface behavior.

Noise thresholds have been developed by NMFS to measure injury for pinnipeds (i.e., on temporary threshold shift (TTS) and permanent threshold shift (PTS)). Sea otter-specific thresholds have not been determined; however, because of their biological similarities, we assume that noise thresholds developed by NMFS for injury for pinnipeds will be a surrogate for sea otter impacts as well. When PTS occurs, there is physical damage to the sound receptors in the ear. Severe cases can result in total or partial deafness. In other cases, the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter 1985).

The noise thresholds established by NMFS for preventing injury to pinnipeds were developed as precautionary estimates of exposures below which physical injury would not occur. There is no empirical evidence that exposure to pulses of airgun sound can cause PTS in any marine mammal, even with large arrays of airguns (Southall et al. 2007). However, given the possibility that mammals close to an airgun array might incur at least mild TTS in the absence of appropriate mitigation measures, researchers have speculated about the possibility that some individuals occurring very close to airguns might incur PTS (e.g., Richardson et al. 1995).

Single or occasional occurrences of mild TTS are not indicative of permanent auditory damage, but repeated or (in some cases) single exposures to a level well above that causing TTS onset might elicit PTS. By means of preventing the onset of TTS, it is highly unlikely that marine mammals could receive sounds strong enough (and over a sufficient duration) to cause permanent hearing impairment. Until specific sea otter thresholds are developed for both Level A and Level B harassment and injury, the use of NMFS thresholds for pinnipeds as a surrogate for sea otters remains the best available information. NMFS's thresholds are further described and justified in NOAA (2005), NOAA (2006), NOAA (2008), and Southall et al. (2007) for our analysis.

A sea otter could experience a TTS as a result of BlueCrest's proposed operations, but there is no information on TTS impacts to sea otters, an animal that spends much time at the surface. The average dive time of a northern sea otter, is only 85 sec (Bodkin et al. 2004) to 149 sec (Wolt et al. 2012). Wolt et al. (2012) found Prince William Sound sea otters to average 8.6 dives per feeding bout. Multiplied by the average dive time (149 sec), the average total time a sea otter spends underwater during a feeding is about 21 min, or 12 to 18 percent of the time of a typical 2- to 3-hour slack-tide seismic shoot. Except for loud screams between pups and mothers (McShane *et al.* 1995), sea otters do not appear to communicate vocally, either at the surface or under water, and they do not use sound to detect prey. Thus, any TTS due to seismic noise is unlikely to mask communication or reduce foraging efficiency. Finally, sea otters are unlikely to rely on sound to detect and avoid predators. For example, sea otters at the surface are not likely to hear killer whale vocalizations.

A PTS occurs when continuous noise exposure causes hairs within the inner ear system to die. This can occur due to moderate durations of very loud noise levels, or long-term continuous exposure of moderate noise levels. However, PTS is also not an issue with sea otters and impulsive seismic noise. Sea otter exposure to underwater noises generated by vessels (propellers) would be of very short duration because the average dive time of a northern sea otter is only 85 sec (Bodkin *et al.* 2004) to 149 sec (Wolt *et al.* 2012). Airborne exposure is of little concern since pressure release and Lloyd's mirror-effect will reduce underwater seismic noise transmitted to the air. Riedman's (1983, 1984) observations of sea otters lack of reaction to seismic noise was likely due largely to these transmission limits.

In conclusion, using information available for other marine mammals as a surrogate, and taking into consideration what is known about sea otters, the Service has set the received sound level under water of 160 dB as a threshold for Level B take by disturbance for sea otters for this proposed IHA (Ghoul and Reichmuth 2012a and b, McShane *et al.* 1995, NOAA 2005, Riedman 1983, Richardson *et al.* 1995). Exposure to unmitigated noise levels in the water greater than 160 dB will be considered by the Service as potentially injurious Level B take; and levels above 190 dB will be considered Level A take threshold for sea otters. Level A take will not be authorized and will be avoided through mitigation measures.

Seismic Operations

Air gun arrays typically produce most noise energy in the 10 to 120 Hertz (Hz) range, with some energy extending to 1,000 Hz (Richardson *et al.* 1995). Sound reception studies by Ghoul and

Reichmuth (2012) determined that sea otters effectively hear between 125 Hz and 32 kHz, or above the range where most seismic energy is produced. Thus, sea otters appear to have limited hearing of seismic air guns (especially compared to humans with effective hearing down to 20 Hz). To the extent that sea otters can detect seismic noise, the potential effects of BlueCrest's proposed activities are described below.

Masking occurs when louder noises interfere with marine mammal vocalizations or their ability to hear natural sounds in their environment (Richardson *et al.* 1995). These noise levels limit their ability to communicate and avoid predation or other natural hazards. However, as mentioned above, sea otters do not vocally communicate underwater (Ghoul and Reichmuth 2012), and masking due to exposure to underwater noise is not relevant. Sea otters do communicate above water with the loud screams between separated mothers and pups (McShane *et al.* 1995). Ghoul and Reichmuth (2012) measured these vocalizations and found that the intensity of these calls ranged between 50 and 113 dB Sound Pressure Level (SPL), and were loud enough that they can be heard by humans at distances exceeding 1 km (0.62 miles) (McShane *et al.* 1995). Any potential masking effect from any noise entering the air from the seismic guns would be brief (a shot) and would likely disappear a few meters from the source.

The seismic airguns that will be used during BlueCrest's Cook Inlet operation have the potential to acoustically injure marine mammals at close proximity. As no sound levels have been effectively measured to establish the threshold where injury caused by an acoustic source exists, the 190-dB criterion for seals applies most closely to sea otters given their more similar natural history than compared to cetaceans.

BlueCrest intends to conduct VSP operations at the end of drilling each well using an array of airguns with total volumes of between 600 and 880 cubic inches (in³). The VSP operation is expected to last less than two days at each well site. Illingworth & Rodkin (2014) measured noise levels associated with VSP (using a 750 in³ airgun array) conducted at Cosmopolitan State #A-1 in 2013. The results indicated that the 190 dB radius (Level A take threshold) from source was 120 m (394 ft), and the 160 dB radius (Level B disturbance take threshold) was 2.47 km (1.54 mi).

Seismic operations could also cause behavioral effects on sea otters. For example, severe disturbance from seismic noise or activities could cause female-pup separations, male territory abandonment, male territory shifts and conflicts between territories, breakup of rafts of nonbreeding males, and/or movement by individual sea otters out of nearshore areas into deeper water. These types of displacement events, if they occurred, could have repercussions on breeding success and/or survival due to increased risk of predation or other adverse conditions. However, because sea otters spend relatively large amounts of time above the water surface compared to other marine mammals, sea otters' potential exposure to the underwater acoustic stimuli, such as those associated with seismic surveys (Greene and Richardson 1988), may be lower than that of other marine mammal species (Richardson et al. 2011). As previously stated, studies have not shown these kinds of dramatic responses when sea otters were exposed to seismic operations. Therefore, we have no reason to believe that sea otters will exhibit any of these reactions during these activities.

To date, there is no evidence that serious injury, death, or stranding of sea otters can occur from exposure to airgun pulses, even in the case of large airgun arrays. As a result, the Service does not expect any sea otters to incur serious injury (Level A harassment) or mortality in Cook Inlet or strand as a result of the proposed activities.

Drilling Operations

For BlueCrest's drilling operation, two project components have the potential to disturb sea otters: driving the conductor pipe at each well prior to drilling, and VSP operations that may occur at the completion of each well drilling. As described in BlueCrest's petition, the CPD and VSP are impulsive noise activities. Here the Level B disturbance exposure to sound levels greater than 160 dB applies, and take is addressed relative to noise levels exceeding 160 dB, above which disturbance can occur until 190 dB, after which potential injury and Level A disturbance can occur.

Conductor Pipe Driving (CPD)

A conductor pipe is a relatively short, large-diameter pipe driven into the sediment prior to the drilling of oil wells. Conductor pipes are usually installed using drilling, pile driving, or a combination of these techniques. BlueCrest proposes to drive approximately 90 m (300 ft) of 76.2-cm (30-in) conductor pipe at Cosmopolitan #2 (and any associated delineation wells) prior to drilling using a Delmar D62-22 impact hammer. This hammer has impact weight of 6,200 kg (13,640 pounds) and reaches maximum impact energy of 224 kilonewton-m (165,215 foot-

pounds) at a drop height of 3.6 m (12 ft).

Blackwell (2005) measured the noise produced by a Delmar D62–22 driving 91.4-cm (36-inch) steel pipe in Cook Inlet and found sound pressure levels to exceed 190 dB at about 60 m (200 ft), 180 dB at about 250 m (820 ft), and 160 dB at just less than 1.9 km (1.2 mi). Each CPD event is expected to last 1 to 3 days, although actual noise generation (pounding) would occur only intermittently during this period. It is anticipated that sea otters will move away from any sound disturbance caused by the pipe driving or become habituated.

Vertical Seismic Profiling

Once a well is drilled, accurate followup seismic data can be collected by placing a receiver at known depths in the borehole and shooting a seismic airgun at the surface near the borehole. This gathered data provides not only high-resolution images of the geological layers penetrated by the borehole, called VSP, but it can also be used to accurately correlate (or correct) the original surface seismic data.

BlueCrest intends to conduct VSP operations at the end of drilling each well using an array of airguns with total volumes of between 9.83 and 14.42 liters (600 and 880 in³). Each VSP operation is expected to last less than 1 or 2 days. Assuming a 1-m source level of 227 dB for a 14.42-liter (880-cubic-inch) array and using Collins et al.'s (2007) transmission loss model for the Cook Inlet ($18.4 \log(R) - 0.00188R$), the 190-dB radius (Level A take threshold for pinnipeds and surrogate for sea otters) from source was estimated at 100 m (330 ft), and the 160-

dB radius (Level B disturbance take threshold for all sea otters) at 2.46 km (1.53 mi). These were the initial injury and safety zones established for monitoring during a VSP operation conducted by Buccaneer at Cosmopolitan State #1 during July 2013. Illingworth and Rodkin (2013) measured the underwater noise levels associated with the July 2013 VSP operation using an 11.8-liter (720 in³) array and found the noise exceeding 160 dB extended out 2.47 km (1.56 mi) or virtually identical to the modeled distance. The measured radius to the 190-dB level was 75 m (246 ft). The best fit model for the empirical data was $227 - 19.75 \log(R) - 0.0R$ (Illingworth and Rodkin 2013).

Exploratory Drilling and Standard Operation

The jack-up drilling rig, *Endeavour*, is not expected to impact sea otters. Lattice-legged, jack-up drill rigs are relatively quiet because the lattice legs limit transfer of noise generated from the drilling table to the water (Richardson et al. 1995, Spence et al. 2007). Further, the drilling platform and other noise-generating equipment are located above the ocean surface, so there is very little surface contact with the water compared to drill ships and semi-submersible drill rigs. For example, the *Spartan 151*, the only other jack-up drilling rig operating in the Cook Inlet, was hydro-acoustically measured by Marine Acoustics, Inc. (2011) while operating in 2011. The survey results showed that continuous noise levels exceeding 120 dB extended out only 50 m (164 ft), and that this noise was largely associated with the diesel engines used as power generators. The *Endeavour* was hydro-acoustically tested during drilling activities by Illingworth and Rodkin (2013) in May 2013, while the rig was operating at Cosmopolitan State #1. The results from the sound source verification indicated that noise generated from drilling or

generators were below ambient noise. The generators used on the *Endeavour* are mounted on pedestals specifically to reduce noise transfer through the infrastructure, and they are enclosed in an insulated engine room. In addition, the submersed deep-well pumps that cool the generators and charge the fire-suppression system also generate noise levels exceeding 120 dB out a distance of approximately 300 m (984 ft). However, the Service does not anticipate that this level of noise will impact sea otters. Thus, neither actual drilling operations nor running generators on the *Endeavour* drill rig generates underwater noise levels exceeding 120 dB.

For this IHA analysis, acoustical injury to sea otters can occur if received noise levels exceed 190 dB. This is classified as a Level A take (injury), which is not authorized by IHAs. The towing, drilling, and pump operations to be used during BlueCrest's program do not have the potential to acoustically injure marine mammals. Therefore, no shutdown safety zones will be established for these activities. However, the conductor pipe driving and VSP operations do generate impulsive noises exceeding 190 dB. Based on the estimated distances to the 190-dB isopleth addressed above, a 60-m (200-ft) shutdown safety zone will be established and monitored during conductor pipe driving (at least until the noise levels are empirically verified), while a 75-m (246-ft) shutdown safety zone will be monitored during VSP operations. Northern sea otters may be disturbed at noise levels between 160 dB to 190 dB, where disturbance can occur (Level B harassment) out to approximately 0.75 km (2.5 mi). If these takes occur, they are likely to result in nothing more than short-term changes in behavior.

Estimated Incidental Take of Sea Otters by Harassment

As described earlier, the Service anticipates that incidental take will occur during Cook Inlet oil and gas activities conducted by BlueCrest. In the sections below, we estimate take by harassment of the numbers of sea otters from the Southcentral stock that are likely to be affected during the proposed activities. The proposed BlueCrest activities, previously discussed in detail, will primarily occur in a limited area around the drilling rigs at the Cosmopolitan #A-2, #A-3, and #B-1 sites.

The jack-up rig would be towed to the Cosmopolitan State well site coming from either Port Graham, a travel distance of about 50 km (31 mi), or from upper Cook Inlet approximately 100 km (62 mi) north of Cosmopolitan State (Figure 6-1, Owl Ridge 2015, page 14). After drilling is complete, the rig will be released and moved away from the well sites to a location of the owner's discretion. The jack-up rig could be towed multiple times during 2016, but only the tow from Port Graham or upper Cook Inlet to Cosmopolitan State #2, and between Cosmopolitan State #2 and #1, are addressed in this IHA petition. It is estimated that the longer tows (to and from the Cosmopolitan State leases) will take 2 days to complete, while tows between Cosmopolitan well sites will take but a few hours. The rig will be wet-towed by two or three ocean-going tugs licensed to operate in Cook Inlet. Tugs generate their loudest sounds while towing due to propeller cavitation. These continuous sounds have been measured at up to 171 dB at source (broadband), and are generally emitted at dominant frequencies of less than 5 kHz (Miles et al. 1987, Richardson et al. 1995, Simmonds et al. 2004).

The dominant noise frequencies from propeller cavitation are significantly less than the dominant hearing frequencies for pinnipeds (10 to 30 kHz) and toothed whales (12 to >100 kHz), but

within the hearing range of sea otters in general (Wartzok and Ketten 1999). Also, because it is currently unknown which tug or tugs will be used to tow the rig, and there are few sound signatures for tugs in general, the potential area that could be ensonified by disturbance level noise is calculated based on an assumed 171 dB source. Using Collins et al.'s (2007) $18.4 \log(R) - 0.00188R$ spreading model, we determine from hydroacoustic surveys in Cook Inlet, the distance to the 160 dB isopleth would be at 253 meters (830 feet). Therefore, while towing, the operating tug would ensonify a strip 0.51 km (0.31 mi) wide. The ensonified area of the route was determined by multiplying route length by the ensonified strip width, which equates to 253 m multiplied by 2. Subsequently, the ZOI for the route from Port Graham to well site #B-1 is 25.3 km^2 , for the route from upper Cook Inlet to #B-1 is 50.6 km^2 , and for the route between #B-1 and #A-2 is 0.84 km^2 . Rig movement between well site #A-2 and #A-3 is only a few meters and represents a ZOI of 0.40 km^2 . Depending on the route of the tow, it is expected that no more than 10 km of the entire (regardless of direction) track will occur within the expected otter habitat (5 km from shore) and represents a ZOI of 5.1 km^2 .

Ensonified Area—Pipe Driving

The Delmar D62-22 diesel impact hammer proposed to be used by BlueCrest to drive the 76.2-cm (30-in) conductor pipe was previously acoustically measured by Illingworth & Rodkin (2014) during drilling operations at Cosmopolitan State #A-1. They found that sound exceeding Level A noise limits for pinnipeds (and presumably for sea otters) to extend to about 55 m (180 ft).

Level B disturbance levels extended to just less than 1.63 km (1.0 mi). The associated ZOI (area ensonified by noise greater than 160 dB) is 8.3 km^2 (3.1 mi^2).

Ensonified Area—Vertical Seismic Profiling

Illingworth & Rodkin (2014) measured noise levels associated with VSP (using a 750 in³ airgun array) conducted at Cosmopolitan State #A-1 in 2013. Their results indicated that the 190 dB radius (Level A take threshold for pinnipeds and presumably sea otters) from source was 120 m (394 ft), and the 160 dB radius (Level B disturbance take threshold) was 2.47 km (1.54 mi).

Based on these results, the associated (160 dB) ZOI would be 19.2 km^2 (7.4 mi^2).

Sea Otter Densities

There are no published sea otter density estimates for the nearshore area along the Kenai Peninsula. Larned (2006) estimated from winter surveys for Steller's eider that there were 92 sea otters (December 2004) inhabiting the survey area—a 300-km^2 area north of Anchor Point.

Larned (2006) also estimated that the expansion factor, or the ratio of the full survey area to the area actually sampled, was 3.27. Applied to the count data the estimated number of sea otters in the survey area north of Anchor Point was 300 animals, or $1.0/\text{km}^2$. This estimate does not take into account missed animals; either because they were submerged or difficult to distinguish from the aerial platform (especially pups). Evans et al. (1997) calculated a correction factor of 2.38 for sea otters missed during aerial surveys conducted along the Aleutian Islands. Applying this correction factor (2.38) to the calculated density of 1.0 km^2 increases the estimated sea otter

density to 2.38 sea otters/km². A fall 2013 survey (Owl Ridge unpublished data) of this region using line-transect methods and program DISTANCE produced a density estimate of 2.6 sea otters/km². It is, therefore, realistic to utilize the 2.38 density estimate in calculating estimated exposures.

Exposure Calculations

For purposes of this analysis, “potential exposure” was defined as a sea otter occurring within an active ZOI of a specific noise-generating activity. As discussed below, this potential exposure does not necessarily constitute a Level B take, especially if the sea otter remains above water and is not directly exposed to underwater noise. Thus, the calculated exposure values represent the number of sea otters that are in a position (within an active ZOI) of receiving harassment take noise levels should they dive during the encounter.

The estimated potential exposures of sea otters by BlueCrest’s planned exploratory drilling project was determined using density estimates derived from Larned (2006) above as adjusted for missed animals (2.38/km²). Potential exposures were derived by multiplying the maximum density (2.38 sea otters /km²) by the ZOI for each activity and then by the estimated number of days the activity would occur. The rig tow is expected to last for about 2 to 3 days, the pipe driving about 12 days, and the VSP about 3 days. However, pipe driving and VSP activity will occur only sporadically on any given day. The exposure calculations can be found in Table 2.

Table 2: Estimated Number of Potential Exposures during the 2016 Drilling Period

| | Tow | Conductor Pipe | VSP | Total |
|---|------------|-----------------------|------------|--------------|
| ZOI (km²) | 5.1 | 8.3 | 19.2 | |
| Otter Density (No./km²) | 2.38 | 2.38 | 2.38 | |
| Days | NA | 12 | 3 | |
| Potential Exposures | 12 | 238 | 138 | 388 |

As mentioned above, an acoustical harassment take of a sea otter does not occur should the animal remain at the surface during the period it is found within the ZOI. During the 2013 drilling activities at Cosmopolitan State #1, only 52 of 356 recorded sea otters, or about 15 percent, actually dove underwater while within 260 m (853 ft) of the drill rig (most sea otters simply drifted past, and were often asleep). Thus, the exposure estimate of 388 found in Table 2 is conservative because it does not take into account that most sea otters are not expected to dive while drifting past the rig operations.

Take Authorization Request

The potential exposures for the 2016 drilling period, based on sea otter density, is estimated to be 388 sea otters (Table 2), or about 2.1 percent of the stock. Taking into account the 15 percent of the sea otters that are likely to dive while in the vicinity of the drill rig, the estimated number of exposures reduces to 58, or about 0.4 percent of the stock. However, because sea otter behavior is difficult to predict, the more conservative 388 sea otters potentially exposed is the requested authorization.

The Service determined that the BlueCrest activities most likely to result in the take of sea otters, as defined under the MMPA, are CPD and VSP. These activities will generate noise levels in the water that may cause short-term, temporary, nonlethal, but biologically significant changes in

behavior to sea otters that the Service considers to be Level B take by disturbance under the MMPA. Other proposed activities, such as rig towing, noise generated from routine rig activities, routine boat traffic, and periodic air traffic were considered to have a limited potential for disturbance leading to Level B take. Adherence to specified operating conditions will ensure that take is minimized. The Service made these determinations, in part, based on information provided in the petition materials provided by BlueCrest, including the Marine Mammal Monitoring and Mitigation Plan (4MP).

Potential Effects on Sea Otter Habitat

As described previously, the primary potential impacts to sea otters are associated with high-energy impulsive sound levels. However, other potential impacts are also possible to the surrounding habitat from physical disturbance, discharges, or an oil spill.

Since sea otters typically inhabit nearshore marine areas, shoreline length is a readily available metric that can be used to quantify sea otter habitat. The total length of shoreline within the range of the Southcentral Alaska stock of northern sea otters is approximately 2,575 km (1,600 mi), of which 540 km (335.5 mi) are located within Cook Inlet. Of that, the total length of shoreline for the proposed activities is a small percentage of the total shoreline habitat available to the Southcentral sea otter stock.

Potential Impacts to Prey

In addition to the disturbances outlined above to sea otter habitat from noise, seismic activities could affect sea otter habitat in the form of impacts to prey species. The primary prey species for sea otters are sea urchins, abalone, clams, mussels, crabs, and squid (Tinker and Estes 1999). When preferential prey are scarce, sea otters will also eat kelp, crabs, clams, turban snails, octopuses, barnacles, sea stars, scallops, rock oysters, fat innkeeper worms, and chitons (Riedman and Estes 1990).

Potential Impacts from Seismic Surveys

Little research has been conducted on the effects of seismic operations on invertebrates (Normandeau Associates, Inc. 2012). Christian et al. (2003) concluded that there were no obvious effects from seismic signals on crab behavior and no significant effects on the health of adult crabs. Pearson et al. (1994) had previously found no effects of seismic signals upon crab larvae for exposures as close as 1 m (3.3 ft) from the array, or for mean sound pressure as high as 231 dB. Invertebrates such as mussels, clams, and crabs do not have auditory systems or swim bladders that could be affected by sound pressure. Squid and other invertebrate species have complex statocysts (Nixon and Young 2003) that resemble the otolith organs of fish that may allow them to detect sounds (Budelmann 1992). Normandeau Associates, Inc. (2012) concluded that invertebrates are sensitive to local water movements and to low-frequency particle accelerations generated by sources in their close vicinity. Based on these results, impulsive CPD and VSP could acoustically impact local marine communities, but only out to about 2 or 3 m (6 to 9 ft) at most. From an ecological community standpoint, these impacts are considered minor.

Potential Impacts from Drill Rig Presence

The potential direct habitat impact by the BlueCrest drilling operation is limited to the actual drill-rig footprint defined as the area occupied and enclosed by the drill-rig legs. The jack-up rig will temporarily disturb up to three offshore locations in upper Cook Inlet, where the wells are proposed to be drilled. Bottom disturbance would occur in the area where the three legs of the rig would be set down and where the actual well would be drilled.

The Cosmopolitan State #B-1 well site is located in lower Cook Inlet. Cook Inlet is a large subarctic estuary roughly 300 km (186 mi) in length and averaging 96 km (60 mi) in width. It extends from the city of Anchorage at its northern end and flows into the Gulf of Alaska at its southernmost. For descriptive purposes, Cook Inlet is separated into unique upper and lower sections, divided at the East and West Forelands, where the opposing peninsulas create a natural waistline in the length of the waterway, measuring approximately 16 km (10 mi) across (Mulherin *et al.* 2001).

The potential direct habitat impact by the BlueCrest drilling operation is limited to the actual drill-rig footprint defined as the area occupied and enclosed by the drill rig legs. This area was calculated as 0.22 hectares (ha) (0.54 acres) during the land use permitting process. The collective 0.8-ha (2-ac) footprint of the well represents a very small fraction of the 18,950-km² (7,300-mi²) Cook Inlet surface area. Potential damage to the Cook Inlet benthic community will be limited, however, to the actual surface area of the three spud cans (collective total of 442 m² (4,755 ft²)) that form the “foot” of each leg. Given the high tidal energy at the well site

locations, drilling footprints are not expected to support benthic communities equivalent to shallow lower energy sites found in nearshore waters. The presence of the drill rig is not expected to result in any direct loss of sea otter habitat.

Potential Impacts from Drilling Discharges

The drill rigs will operate under an APDES general permit for wastewater discharges. This permit authorizes discharges from oil and gas extraction facilities engaged in exploration under the Offshore and Coastal Subcategories of the Oil and Gas Extraction Point Source Category (40 CFR part 435). Twelve effluents are authorized for discharge into Cook Inlet once discharge limits set by the Alaska Department of Environmental Conservation have been met. The authorized discharges include drilling fluids and drill cuttings, deck drainage, sanitary waste, domestic waste, blowout preventer fluid, boiler blowdown, fire control system test water, uncontaminated ballast water, bilge water, excess cement slurry, mud cuttings cement at sea floor, and completion fluids. The drill rig will also be authorized under the Environmental Protection Agency's (EPA's) Vessel General Permit for deck washdown and runoff, gray water, and gray water mixed with sewage discharges. Drilling wastes include drilling fluids, known as mud, rock cuttings, and formation waters. Drilling wastes (non-hydrocarbon) will be discharged to the Cook Inlet under the approved APDES general permit.

Drilling wastes (hydrocarbon) will be delivered to an onshore permitted location for disposal. BlueCrest will conduct an Environmental Monitoring Study of relevant hydrographic, sediment hydrocarbon, and heavy metal data from surveys conducted before and during drilling mud

disposal and at least 1 year after drilling operations cease in accordance with the APDES general permit for discharges of drilling muds and cuttings.

Non-drilling wastewater includes deck drainage, sanitary waste, domestic waste, blowout preventer fluid, boiler blowdown, fire control test water, bilge water, noncontact cooling water, and uncontaminated ballast water. Non-drilling wastewater will be discharged into Cook Inlet under the approved APDES general permit or delivered to an onshore permitted location for disposal. Mud cuttings will be constantly tested. Hydrocarbon-contaminated muds will be hauled offsite. Solid waste (e.g., packaging, domestic trash) will be classified, segregated, and labeled as general, universal, and Resource Conservation and Recovery Act exempt or nonexempt waste. Solid waste will be stored in containers at designated accumulation areas until it can be packaged and transported to an approved onshore disposal facility. Hazardous wastes should not be generated as a result of this project. However, if any hazardous wastes are generated, they will be temporarily stored in an onboard satellite accumulation area and then transported offsite for disposal at an approved facility.

Discharging drill cuttings or other liquid waste streams generated by the drilling rig—even in permitted amounts—could potentially affect marine mammal habitat. Toxins could persist in the water column, which could have an impact on marine mammal prey species. However, despite a considerable amount of investment in research on exposures of marine mammals to organochlorines or other toxins, no marine mammal deaths in the wild can be conclusively linked to the direct exposure to such substances (O’Shea 1999).

Drilling muds and cuttings discharged to the seafloor can lead to localized increased turbidity and increase in background concentrations of barium and occasionally other metals in sediments and may affect lower trophic organisms. Drilling muds are composed primarily of bentonite (clay), and the toxicity is, therefore, low. Heavy metals in the mud may be absorbed by benthic organisms, but studies have shown that heavy metals do not bio-magnify in marine food webs (Neff et al. 1989). Effects on benthic communities are nearly always restricted to a zone within about 100 to 150 m (328 to 492 ft) of the discharge, where cuttings accumulations are greatest. Discharges and drill cuttings could impact fish by displacing them from the affected area. No water quality impacts are anticipated from permitted discharges that would negatively affect habitat for Cook Inlet sea otters.

Potential Impacts from an Oil Spill or Unpermitted Discharge

The probability of an oil spill from the proposed activities is low. Potential sources would be a release from a vessel. An oil spill or unpermitted discharge is an illegal act; IHAs do not authorize takes of sea otters caused by illegal or unpermitted activities.

If an oil spill did occur, the most likely impact upon sea otters would be mortality due to exposure to and ingestion of spilled oil. Also, contamination of sea otter habitat, their invertebrate prey, and prey habitat would most likely result in a range of impacts ranging from sublethal to lethal, depending on a wide variety of factors. Spill response activities are not likely to disturb the prey items of sea otters sufficiently to cause more than minor effects. Spill response activities could cause sea otters to avoid contaminated habitat that is being cleaned.

Based on the preceding discussion of potential types and likelihood of impacts to sea otters, their prey, and habitat, the Service anticipates that the proposed activities are not likely to cause more than negligible, short-term, and temporary impacts to a small number of sea otters and to a small fraction of sea otter habitat.

Potential Impacts on Subsistence Uses

The MMPA allows for Alaska Natives to harvest sea otters for subsistence purposes or for the purposes of creating authentic Native articles of handicrafts and clothing, provided this is accomplished in a non-wasteful manner.

Data from the Service's Marine Mammal Marking, Tagging, and Reporting Program (MTRP) indicates that between 1989 and 2015 (27 years), Alaska Natives harvested a total of 715 sea otters hunting from the community of Homer, while Port Graham reported 215, Seldovia 122, Nanwalek 39, Kenai 31, and Ninilchik 16 sea otters harvested (USFWS MTRP unpublished data); the mean reported annual subsistence take from 2009 through 2015 from Homer, Port Graham, Seldovia, Nanwalek, Kenai, and Ninilchik of sea otters in or near the proposed project areas was 239 animals (USFWS MTRP unpublished. data).

BlueCrest has reached out and coordinated with local communities, including Kenai, Homer, and Ninilchik, as well as Kenai Peninsula Borough and Cook Inlet Region, Inc. Any observed sea

otter interactions with the BlueCrest operations deemed potentially harmful will be immediately reported to the Service by BlueCrest or their representative.

The impact of drilling operations is unlikely to affect any sea otter sufficient to render it unavailable for subsistence harvest in the future. Oil spill trajectory scenarios indicate that potential spills would travel south through the central channel of the inlet away from shoreline subsistence harvest areas. For these reasons, we conclude that these activities will not impact the availability of sea otters for subsistence harvest in Cook Inlet.

Mitigation Measures

Holders of an IHA must use methods and conduct activities in a manner that minimizes to the greatest extent practicable adverse impacts on sea otters, their habitat, and on the availability of sea otters for subsistence uses. Adaptive management approaches, such as temporal or spatial limitations in response to the presence of sea otters in a particular place or time or the occurrence of sea otters engaged in a particularly sensitive activity (such as feeding), must be used to avoid or minimize interactions with sea otters, and subsistence users of these resources. BlueCrest has developed a 4MP for proposed Cook Inlet drilling activities. This 4MP is designed to monitor and mitigate for all marine mammals regardless of status or agency jurisdiction. The primary concern is the harassing levels of underwater noise produced by the drilling program operations.

Compared to non-jack-up drill rigs, the use of the jack-up drilling rig *Spartan 151* will mitigate potential noise impacts. Jack-up rigs have less surface contact with the water and convey less noise from the drilling table and generators into the underwater environment. Sound source verifications conducted by MAI (2011) confirmed that underwater drilling and generator noises produced by the *Spartan 151* are near ambient.

Shutdown safety zones will be established and monitored during pipe driving and VSP activities. Shutdowns will be implemented to avoid injury take to all marine mammals including sea otters. In the unlikely event of an oil spill, BlueCrest will be working with CISPRI, which is certified as a U.S. Coast Guard oil spill removal organization and State of Alaska Primary Response Action Contractor serving the Cook Inlet region of Alaska. BlueCrest will follow the procedures as outlined in CISPRI's Technical Manual, Wildlife Tactics. Most procedures discussed in the CISPRI Technical Manual are associated with responses for either waterfowl or marine mammals. The CISPRI will dedicate personnel and equipment as appropriate in support of wildlife during a spill. The Planning Chief will work to implement a Wildlife Plan addressing those species anticipated to be at risk and needing protection. The protocols are described in further detail in the Oil Discharge Prevention and Contingency Plan.

Under this Authorization, BlueCrest will be required to use the following mitigation measures to ensure no Level A and no more than authorized Level B takes of sea otters occur. These include conditions for operational and support vessels, aircraft, offshore seismic surveys, safety zones, ramp-up procedures, power down and shutdown, emergency shutdown, Drill Rig Tows, Drive Pipe Driving, Rig Operation, VSP Operations, and Sea Otter Observers. BlueCrest will also be

required to have sufficient and continual sound monitoring equipment to ensure that following mitigation measures can be applied. BlueCrest's 4MP and the following mitigation measures will ensure that the numbers of Southcentral stock of sea otters likely to be encountered during project operations will ensure that Level B take will be minimal and below the prescribed take allowance.

Operational and Support Vessels

- Operational and support vessels must be staffed with trained and qualified observers to alert crew of the presence of sea otters and initiate adaptive mitigation responses.
- Vessel operators must take every precaution to avoid harassment to sea otters when a vessel is operating near these animals.
- Vessels must reduce speed and maintain a distance of 100 m (328 ft) from all sea otters when practicable.
- Vessels may not be operated in such a way as to separate members of a group of sea otters from other members of the group.
- When weather conditions require, such as when visibility drops, vessels should adjust speed accordingly to avoid the likelihood of injury to sea otters.
- All vessels must avoid areas of active or anticipated subsistence hunting for sea otters as determined through community consultations.
- We may require a monitor on site of the activity or onboard drillships, drill rigs, support vessels, aircraft, or vehicles to monitor the impacts of an activity on sea otters.

Aircraft:

- Operators of support aircraft must, at all times, conduct their activities at the maximum distance possible from sea otters.
- Fixed-wing aircraft must operate at an altitude no lower than 91 m (300 ft) in the vicinity of sea otters.
- Rotary winged aircraft (helicopters) must operate at an altitude no lower than 305 m (1,000 ft) in the vicinity of sea otters.
- When weather conditions do not safely allow the required minimum altitudes stipulated above, such as during severe storms or when cloud cover is low, aircraft may be operated at lower altitudes.
- When aircraft are operated at altitudes below the required minimum altitudes, the operator must avoid known sea otter locations and should take precautions to avoid flying directly over these areas.
- Aircraft routes must be planned to minimize any potential conflict with active or anticipated sea otter subsistence hunting activity as determined through community consultations.

Offshore Seismic Surveys

Any offshore exploration activity expected to include the production of pulsed underwater sounds with sound source levels ≥ 160 dB will be required to establish and monitor acoustic safety zones and implement adaptive mitigation measures as follows:

Safety Zones

Establish and monitor with trained and qualified observers an acoustically verified disturbance zone surrounding seismic source arrays where the received level will be ≥ 160 dB and an acoustically verified safety zone surrounding seismic source arrays where the received level will be ≥ 190 dB.

Ramp-up Procedures

For all seismic surveys, including airgun testing, use the following ramp-up procedures to allow marine mammals to depart the disturbance zone before seismic surveying begins.

- Visually monitor the disturbance zone and adjacent waters for sea otters for at least 30 minutes before initiating ramp-up procedures. If no sea otters are detected, you may initiate ramp-up procedures. Do not initiate ramp-up procedures at night or when you cannot visually monitor the disturbance zone for marine mammals.
- Initiate ramp-up procedures by firing a single airgun. The preferred airgun to begin with should be the smallest airgun, in terms of energy output (dB) and volume (cubic inches).
- Continue ramp-up by gradually activating additional airguns over a period of at least 20 minutes, but no longer than 40 minutes, until the desired operating level of the airgun array is obtained.

Powerdown and Shutdown

Immediately power down or shutdown the seismic source array and/or other acoustic sources whenever one or more sea otters are sighted close to or within the area delineated by the 190 dB disturbance zone. If the power down operation cannot reduce the received sound pressure level to 160 dB or less, the operator must immediately shut down the seismic airgun array and/or other acoustic sources.

Emergency Shutdown

If observations are made or credible reports are received that one or more sea otters are within the area of the seismic survey and are indicating acute distress, such as any injury due to seismic noise, the seismic airgun array will be immediately shutdown and the Service contacted. The airgun array will not be restarted until review and approval by the Service.

Drill Rig Tow

Because the ocean tugs will be under tow while they are generating noises of concern they will be traveling at very slow speeds (1 to 5 knots), providing sufficient time for marine mammals to move from the vicinity and avoid any possible injury take due to collision or noises exceeding injury thresholds. Altering courses or speeds to avoid harassment takes will be conducted when

feasible, but completely shutting engines down would represent a major (and perhaps illegal) safety concern given the inherent hazards of towing at sea. Thus, while marine mammals will be monitored, no safety shutdowns will occur; however, marine mammal monitoring will occur during all tow events.

Drive Pipe Driving

Soon after the drill rig is positioned on the well head, the conductor pipe will be driven as the first stage of the drilling operation. At least two marine mammal observers (one operating at a time) will be stationed aboard the rig during this 2 to 3 day operation monitoring a 1.6-km (1-mi) shutdown safety zone. The impact hammer operator will be notified to shutdown hammering operations at the approach of a marine mammal to the safety zone. Also, a ramp up of the hammering will begin at the start of each hammering session. The ramp up procedure involves initially starting with three soft strikes, 30 seconds apart. This delayed-strike start alerts marine mammals of the pending hammering activity and provides them time to vacate the area. Monitoring will occur during all hammering sessions.

Rig Operation

Hydroacoustic tests were conducted by MAI (2011) on the *Spartan 151* in 2011. The results indicated that the lattice legs of the drill rig were preventing significant noise from entering the water column. The MAI (2011) found that underwater noise levels associated with drilling did not exceed ambient, while the large power generators onboard the rig produced noise that

exceeded 120 dB only out about 50 m. Noise associated with drilling and general operation of the drill rig is of little concern to marine mammals.

VSP Operations

As with the CPD, marine mammal observers will be redeployed during the VSP operations to monitor a shutdown safety zone. Illingworth & Rodkin (2014) measured noise levels during VSP operations associated with BlueCrest post-drilling operations at the Cosmopolitan State #B–1 site during July 2013. The results indicated that the 720-in³ airgun array used during the operation produced noise levels exceeding 160 dB out to a distance of approximately 2.47 km (1.54 mi). Thus, all VSP monitoring will involve a 2.5-km (1.55-mi) shutdown zone. The airgun operator will be notified to shut down firing of the guns at the approach of a marine mammal to the safety zone. Also, a “soft start” ramp up of the guns will begin at the start of each airgun session.

Sea Otter Observers

The initial rig tow from Port Graham to Cosmopolitan #B–1 is expected to last less than 12 hours. A single observer will monitor for sea otters during the tow. If the rig is towed from an upper Cook Inlet location, and is expected to last more than 12 hours (which it is), then two observers, working alternate shifts, will be used.

Pipe driving is expected to take 2 to 3 days to complete. Two sea otter observers, working alternate shifts, will be stationed aboard the drill rig during all pipe driving activities at the well. The observers will operate from a station as close to the well head as safely possible.

As with the pipe driving, two observers will monitor all VSP activities. Monitoring during zero-offset VSP will be conducted by two sea otter observers operating from the drill rig. During walk-away VSP operations, an additional two sea otter observers will monitor from the seismic source vessel.

Only trained sea otter observers will be used during this project. All observers will either have previous experience monitoring for sea otters, or will go through a sea otter (marine mammal) monitoring training course. Less-experienced observers will be paired with veterans. Observers will also be provided with field guides, instructional handbooks, and a contacts list to assist in assuring data are collected effectively and accurately.

Notification of Injured or Dead Sea Otter

In the unexpected event that the specified activity clearly causes the take of a sea otter in a manner not authorized by the IHA (if issued), such as a serious injury or mortality (*e.g.*, ship-strike), BlueCrest would immediately report the incident to the Service. The report would include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved;
- Vessel's speed during and leading up to the incident;
- Description of the incident;
- Status of all sound source use in the 24 hours preceding the incident;
- Water depth;
- Environmental conditions (*e.g.*, wind speed and direction, cloud cover, and visibility);
- Description of all sea otter observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

In the event that BlueCrest discovers an injured or dead sea otter, and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.*, previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), BlueCrest would report the incident to the Service within 24 hours of the discovery. BlueCrest would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS, FWS, and the Marine Mammal Stranding Network.

Maintaining Safe Radii

Acoustical injury to sea otters can occur if received noise levels exceed 190 dB. BlueCrest is not requesting authorization of these takes, termed Level A injury takes, but instead will implement mitigation measures to avoid these takes, including shutdown safety zones. However, the rig towing procedures to be used during BlueCrest's operation do not have the potential to acoustically injure sea otters. Therefore, no shutdown safety zones will be established for this activity. The pipe driving and VSP operations do generate impulsive noises exceeding 190 dB. Based on the estimated distances to the 190 dB isopleth addressed above, a 170-m (560-ft) shutdown safety zone will be established and monitored during pipe driving, while a 240-m (787-ft) shutdown safety zone will be monitored during VSP operations. These safety zones are conservative for sea otters given that injury take is not expected until noise levels reach 190 dB.

Monitoring and Reporting Requirements

We require holders of an IHA to cooperate with the Service and other designated Federal, State, and local agencies to monitor the impacts of oil and gas exploration activities on sea otters. In this case, BlueCrest coordinated with NMFS, Bureau of Safety and Environmental Enforcement, and the Army Corps of Engineers. BlueCrest reached out to the communities of Homer, Port Graham, Kenai, Seldovia, Soldotna, and Ninilchik, as well as Kenai Peninsula Borough, Cook Inlet Region, Inc., Cook Inlet Keeper, United Cook Inlet Drift Association, and the Chugach Alaska Services.

BlueCrest must submit a final report to the Service within 90 days after the end of the project. The report must describe the operations that were conducted and the marine mammals that were observed. The report must include documentation of methods, results, and interpretation pertaining to all monitoring. The 90-day report must summarize the dates and locations of seismic operations, and all sea otter sightings (dates, times, locations, activities, associated seismic survey activities, sea otter behavior, and any observed behavioral changes). All observations of sea otters, including any observed reactions to the seismic operations, will be recorded and reported to the Service.

Monitoring Requirements

Holders of an IHA will be required to:

- Maintain trained and qualified onsite observers to carry out monitoring programs for sea otters necessary for initiating adaptive mitigation responses.
- Place trained and qualified observers on board all operational and support vessels to alert crew of the presence of sea otters to initiate adaptive mitigation responses and to carry out specified monitoring activities identified in the monitoring and mitigation plan necessary to evaluate the impact of authorized activities on sea otters and the subsistence use of sea otters.
- Cooperate with the Service and other designated Federal, State, and local agencies to monitor the impacts of oil and gas exploration activities on sea otters.

The wet-tow will most likely occur during the summer when Alaska days are long. However,

because there are no injury-take concerns with the wet-tows, and only a very low potential for acoustical harassment, no special considerations will be made to monitor during poor visibility conditions. The CPD and VSP activities will be limited to daylight hours, and when sea conditions are light, therefore, when marine mammal observation conditions will be generally good.

Standard marine mammal observing field equipment will be used including reticule binoculars (10×42), big-eye binoculars (30×), inclinometers, and range-finders. Because rig-towing, CPD, and VSP will be limited to daylight hours, no special equipment such as night scopes or FLIRS (forward looking infra-red thermal imagery system) will be needed.

All location, weather, and marine mammal observation data will be recorded onto a standard field form. Global positioning system and weather data will be collected at the beginning and end of a marine mammal monitoring period and at every half-hour in between. Position data will also be recorded at the change of an observer or the sighting of a marine mammal. Enough position data will be collected to eventually map an accurate charting of any vessel travel. Recorded marine mammal data will also include species, group size, behavior, and any apparent reactions to the project activities. Any behavior that could be construed as a take will also be recorded in the notes.

Reporting Requirements

Holders of an IHA must keep the Service informed on the progress of authorized activities by:

- Notifying the Service at least 48 hours prior to the onset of activities.
- Providing weekly progress reports of authorized activities, noting any significant changes in operating state and or location.
- Notifying the Service within 48 hours of ending activity.

Weekly observation reports

Holders of an IHA must report, on a weekly basis, observations of sea otters during project activities. Information within the observation report will include, but is not limited to:

- Date, time, and location of each sighting.
- Number, sex, and age (if determinable).
- Observer name, company name, vessel name or aircraft number, letter of authorization number, and contact information.
- Weather, visibility, and sea conditions at the time of observation.
- Estimated distance from the animal or group when initially sighted, at closest approach, and end of the encounter.
- Industry activity at time of sighting and throughout the encounter. If a seismic survey, record the estimated ensonification zone where animals are observed.
- Behavior of animals at initial sighting, any change in behavior during the observation period, and distance from Industry activity associated with those behavioral changes.
- Detailed description of the encounter.
- Duration of the encounter.
- Duration of any behavioral response (e.g., diving, swimming, splashing, etc.).

- Mitigation actions taken.

Activity reports will be submitted to the Service within 72 hours of completing each of the three activities (rig tow, pipe driving, and VSP).

Monthly observation reports

The monthly report will contain and summarize the following information pertaining to sea otters as appropriate:

- Dates, times, locations, heading, speed, weather, sea conditions (including Beaufort Sea state and wind force), and associated activities during all seismic operations and marine mammal sightings.
- Species, number, location, distance from the vessel, and behavior of any sighted marine mammals, as well as associated seismic activity (number of power-downs and shutdowns), observed throughout all monitoring activities.
- A description of the implementation and effectiveness of the mitigation measures of the IHA.

After-action monitoring reports

The results of monitoring efforts identified in the 4MP must be submitted to the Service for review within 90 days of the expiration date of the IHA.

The report must include, but is not limited to, the following information:

- A summary of monitoring effort including: total hours, areas/distances, and distribution of sea otters through the project area of each rig, vessel, and aircraft.
- Analysis of factors affecting the visibility and detectability of sea otters by specified monitoring.
- Analysis of the distribution, abundance, and behavior of sea otter sightings in relation to date, location, sea conditions, and operational state.
- Estimates of take based on the number of animals encountered/km of vessel and aircraft operations by behavioral response (no response, moved away, dove, etc.), and animals encountered per day by behavioral response for stationary drilling operations.
- Raw data in electronic format (i.e., Excel spreadsheet) as specified by the Service in consultation with Industry representatives.
- Sighting rates of sea otters during periods with and without airgun activities (and other variables that could affect detectability).
- Initial sighting distances versus airgun activity state (firing, powered down, or shut-down).
- Closest point of approach versus airgun activity state.
- Observed behaviors and types of movements versus airgun activity state.
- Numbers of sightings/individuals seen versus airgun activity state.

Findings

The Service proposes the following findings regarding this action:

Small Numbers Determination and Estimated Take by Incidental Harassment

For small take analysis, the statute and legislative history do not expressly require a specific type of numerical analysis, leaving the determination of “small” to the agency’s discretion. Factors considered in our small numbers determination include the following:

(1) *The number of northern sea otters inhabiting the proposed impact area is small relative to the size of the northern sea otter population.* The potential exposures for the 2016 drilling period, based on otter density, is estimated to be 388 sea otters, or about 2.1 percent of the stock. Taking into account that 15 percent of the sea otters are likely to dive while in the vicinity of the drill rig, the estimated number of exposures reduces to 58. However, because sea otter behavior is difficult to predict, the more conservative 388 sea otters potentially exposed is the requested authorization. This is approximately 2 percent of the estimated population size of 18,297 (USFWS 2014).

(2) *The area where the proposed activities would occur is a relatively small fraction of the available habitat of the Southcentral Alaska stock of northern sea otters.* Since sea otters typically inhabit nearshore marine areas, shoreline length is a readily available metric that can be used to quantify sea otter habitat. The total length of shoreline within the range of the Southcentral Alaska stock of northern sea otters is approximately 2,575 km (1,600 mi), of which 540 km (335.5 mi) are located within Cook Inlet. Of that, the total length of shoreline for the

proposed activities is approximately 60 km (37.3 mi), which is a small percentage of the total shoreline habitat available to the Southcentral sea otter stock. Any potential impacts to prey caused by the proposed activities would occur in the limited area of the shoreline habitat.

(3) Monitoring requirements and mitigation measures are expected to limit the number of incidental takes. Level A harassment (harassment that has the potential to injure sea otters) is not authorized. If a sea otter was observed within or approaching the 190 dB exposure area of the various gun arrays, avoidance measures would be taken, such as decreasing the speed of the vessel and/or implementing a power down or shutdown of the airguns. Power-up and ramp-up procedures would prevent Level A harassment and limit the number of incidental takes by Level B harassment by affording time for sea otters to leave the area. Monitoring and mitigation measures are thus expected to prevent any Level A harassment and to minimize Level B harassment. Further, monitoring and reporting of sea otter activity in proximity to activities will allow the Service to reanalyze and possibly refine and adjust future take estimates as exploration activities continue in sea otter habitat into the future.

The mitigation measures outlined above are intended to minimize the number of sea otters that may be disturbed by the proposed activity. Any impacts on individuals are expected to be limited to Level B harassment and to be of short-term duration. No take by injury or death is anticipated or authorized. Should the Service determine, based on the monitoring and reporting to be conducted throughout the survey activities, that the effects are greater than anticipated, the authorization may be modified, suspended, or revoked.

Negligible Impact

The Service finds that any incidental “take by harassment” that may result from this proposed seismic survey cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival, and would, therefore, have no more than a negligible impact on the stock. In making this finding, we considered the best available scientific information, including: (1) The biological and behavioral characteristics of the species; (2) the most recent information on distribution and abundance of sea otters within the area of the proposed activity; (3) the potential sources of short-term disturbance during the proposed activity; and (4) the potential response of sea otters to this short-term disturbance. In addition, we conducted a thorough review of material supplied by the applicants, information from other operators in Cook Inlet, our files and datasets, data acquired from NMFS, and published reference materials. We also consulted with other sea otter experts in the Cook Inlet area, including the Service and NMFS researchers and local residents.

Limited evidence (Riedman 1983, 1984) suggests that sea otters are not particularly sensitive to or adversely affected by sound. Responses of sea otters to disturbance would most likely be diving and/or swimming away from the sound source, which may entail the temporary, but not sustained, interruption of foraging, breeding, resting, or other natural behaviors. Thus, although 388 sea otters (around 2 percent of the population) are estimated to be potentially taken (i.e., potentially disturbed) by Level B harassment by means of exposure to sound levels of 160dB or greater but less than 190 dB for the duration of the project, we do not expect that this type of harassment would result in adverse effects on the species or stock through effects on annual rates

of recruitment or survival.

Our finding of negligible impact applies to incidental take associated with the proposed activities as mitigated through this authorization process. This authorization establishes monitoring and reporting requirements to evaluate the potential impacts of the proposed activities, as well as mitigation measures designed to minimize interactions with, and impacts to, sea otters.

Impact on Subsistence

We find that the anticipated harassment caused by the proposed activities would not have an unmitigable adverse impact on the availability of sea otters for taking for subsistence uses. In making this finding, we considered the timing and location of the proposed activities and the timing and location of subsistence harvest activities and patterns, as reported through the MTRP, in the proposed project area, as well as the applicants' consultation with potentially affected subsistence communities. More information can be found on our website at <http://www.fws.gov/alaska/fisheries/mmm/iha.htm>.

The Service finds that the proposed activities will have a negligible impact on small numbers of sea otters in Southcentral Alaska and will not have an unmitigable adverse impact on the availability of the stock for subsistence uses. Further, we have prescribed permissible methods of take, means to have the least practicable impact on the stock and its habitat, and monitoring requirements.

Required Determinations

National Environmental Policy Act (NEPA)

We have prepared a draft Environmental Assessment (EA) (see **Public Comments** above) in accordance with the NEPA (42 U.S.C. 4321 et seq.). We have preliminarily concluded that approval and issuance of this authorization for the nonlethal, incidental, unintentional take by Level B harassment of small numbers of northern sea otters in the Southcentral Alaska stock during oil and gas industry exploration activities in the lower Cook Inlet of Alaska would not significantly affect the quality of the human environment, and that the preparation of Environmental Impact Statements on these actions is not required by section 102(2) of the NEPA or its implementing regulations.

Endangered Species Act

Oil and gas exploration in U.S. waters is authorized by The Bureau of Ocean Energy Management, Regulation and Enforcement. All Federal agencies are required to ensure the actions they authorize are not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of critical habitat. The proposed oil and gas activities will occur entirely within the range of the Southcentral Alaska stock of the northern sea otter, which is not listed as threatened or endangered under the ESA. Though it is not a focal species subject to the issuance of this IHA, it is worth noting that the federally listed threatened Steller's eiders (*Polysticta stelleri*) have molting and wintering range

that includes the Cook Inlet. However, during the time period of the proposed project, it is highly unlikely that any Steller's eider will be present in the action area. Additionally, even in the unlikely event that a Steller's eider is present; the issuance of an IHA for BlueCrest's proposed seismic surveys will not have any impact on the species. Thus, the Service's proposed issuance of an IHA will have no effect on Steller's eiders and no additional ESA consultation will be necessary.

Government-to-Government Relations with Native American Tribal Governments

In accordance with the President's memorandum of April 29, 1994, "Government to Government Relations with Native American Tribal Governments" (59 FR 22951), Executive Order 13175, Department of the Interior Secretarial Order 3225 of January 19, 2001 (Endangered Species Act and Subsistence Uses in Alaska (Supplement to Secretarial Order 3206)), Department of the Interior Secretarial Order 3317 of December 1, 2011 (Tribal Consultation and Policy), Department of the Interior Memorandum of January 18, 2001 (Alaska Government-to-Government Policy), the Department of the Interior's manual at 512 DM 2, and the Native American Policy of the U.S. Fish and Wildlife Service, January 20, 2016, we readily acknowledge our responsibility to communicate and work directly on a Government-to-Government basis with federally recognized Alaska Natives Tribes in developing programs for healthy ecosystems, to seek their full and meaningful participation in evaluating and addressing conservation concerns for listed species, to remain sensitive to Alaska Native culture, and to make information available to Alaska Natives.

Furthermore, and in accordance with Department of the Interior Policy on Consultation with Alaska Native Claims Settlement Act of 1971 (ANCSA) Corporations, August 10, 2012, we likewise acknowledge our responsibility to communicate and work directly with ANCSA Corporations in evaluating and addressing conservation concerns for listed species, to remain sensitive to Alaska Native culture, and to make information available to ANSCA Corporations. We have evaluated possible effects on federally recognized Alaska Native Tribes. Through the IHA process identified in the MMPA, Industry presents a communication process, culminating in a Plan of Cooperation (POC), if warranted, with the Native communities most likely to be affected and engages these communities in numerous informational meetings.

Through various interactions and partnerships, we have determined that the issuance of this IHA is appropriate. We are open to discussing ways to continually improve our coordination and information exchange, including through the IHA/POC process, as may be requested by Tribes or other Native groups.

Proposed Authorization

The Service proposes to issue BlueCrest an IHA for the nonlethal, incidental, unintentional take by Level B harassment of small numbers of northern sea otters (*Enhydra lutris kenyoni*) in the Southcentral Alaska stock during industry exploration activities in the lower Cook Inlet of Alaska, as described in this document and in their petition. We neither anticipate nor propose authorization for take by injury or death. The final IHA would be effective immediately after the date of issuance through October 31, 2016.

The final IHA will also incorporate the mitigation, monitoring, and reporting requirements described in this proposal. The applicant will be expected and required to implement and fully comply with those requirements. The IHA will not authorize the intentional take of northern sea otters, nor take by injury or death.

If the nature or level of activity changes or exceeds that described in this proposal and in the IHA petition, or the nature or level of take exceeds that projected in this proposal, the Service will reevaluate its findings. The Secretary may modify, suspend, or revoke this authorization if the findings are not accurate or the mitigation, monitoring, and reporting requirements described herein are not being met.

Karen P. Clark

Acting Regional Director, Alaska Region.

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